JOURNAL WATCH JAN-JUNE 2015

1 LMA Management

-Shah, A. C., Barnes, C., Spiekerman, C. F., & Bollag, L. A. (2015a). Hypoglossal nerve palsy after airway management for general anesthesia: an analysis of 69 patients. Anesthesia and Analgesia, 120(1), 105–120. http://doi.org/10.1213/ANE.0000000000000495
-Atalay, Y. O., Kaya, C., Aktas, S., & Toker, K. (2015). A complication of the laryngeal mask airway: Pharyngolaryngeal rupture and pneumomediastinum. European Journal of Anaesthesiology, 32(6), 439–440. http://doi.org/10.1097/EJA.0000000000000195
-Bick, E., Bailes, I., Patel, A., & Brain, A. I. J. (2014). Fewer sore throats and a better seal: why routine manometry for laryngeal mask airways must become the standard of care. Anaesthesia, 69(12), 1304–1308. http://doi.org/10.1111/anae.12902
-Spence, A., Avery, S., & Smith, C. (2015). Laryngeal cuff pressure - a recoil equilibrium technique. Anaesthesia, 70(3), 371–371. http://doi.org/10.1111/anae.13024
-Thiruvenkatarajan, V., Van Wijk, R. M., & Rajbhoj, A. (2015). Cranial nerve injuries with supraglottic airway devices: a systematic review of published case reports and series. Anaesthesia, 70(3), 344–359. http://doi.org/10.1111/anae.12917

An editorial by Bick et al. draws attention to the widespread sub-optimal intraoperative management of supra-glottic airways. For over 25 years, it has been recommended that LMA cuff pressures should not exceed 60 cm H20. However, many clinicians don't pay regular attention to cuff volumes or pressures. The consequence is that as many as 50% of patients have a sore throat after a LMA anaesthetic and there are many case reports that implicate mucosal pressure from an LMA in nerve injury and pharyngolaryngeal morbidity. Multiple studies show a reduction in sore throat in patients randomised to low-pressure cuff groups. However, many clinicians don't have access to, or use, a manometer to monitor cuff pressures. Unfortunately, the relationship between cuff pressure and volume of air injected is not consistent. Bick et al. believe the accumulated evidence of harm with excess LMA inflation pressures calls for a change in practice and recommend manometry to become routine when an LMA is used, particularly if N20 is administered. To support this argument, two studies report on nerve injuries associated with airway management. Thiruvenkatarajan et al. report on over 50 cranial nerve injuries with supraglottic airways. Lingual nerve injury was the most commonly reported, followed by recurrent laryngeal, hypoglossal, glossopharyngeal, inferior alveolar and infra-orbital. Some patients suffered combined nerve injuries. The authors conclude that injury is generally though to result from pressure neuropraxia and some may be preventable with cuff monitoring. Shah et al. analysed 69 patients who sustained a hypoglossal nerve palsy after anaesthesia. Hypoglossal nerve injury results in dysarthria, dysphagia and dyspnoea. Most patients in this series were intubated but 11 patients had supraglottic airway management. Shah et al. also recommend routine measurement of LMA and ETT cuff pressures. Considering these injuries are rare and likely under-reported, these publications are concerning. A further case report by Atalay et al. describes a pharyngeal mucosal abrasion injury associated with an otherwise uneventful insertion of a laryngeal mask for general anaesthesia that resulted in widespread pneumomediastinum, pneumoperitoneum and subcutaneous emphysema extending from the cervical region to the anterior abdominal wall. The aetiology of this is unclear but likely contributing factors include mucosal pressure from SGA and patient frailty.

Take Home Message: Consideration should be given to routinely monitoring supra-glottic airway cuff pressures.

2 Blood management

-American Society of Anesthesiologists Task Force on Perioperative Blood Management. (2015, February). Practice guidelines for perioperative blood management: an updated report by the American Society of Anesthesiologists Task Force on Perioperative Blood Management*. Anesthesiology. http://doi.org/10.1097/ALN.0000000000000463
-Bailey, C. R., Klein, A. A., & Hunt, B. J. (2015). Blood--the most important humour? Anaesthesia, 70 Suppl 1, 1–2– e1. http://doi.org/10.1111/anae.12930
-Cata, J. P. (2015). Perioperative anemia and blood transfusions in patients with cancer: when the problem, the solution, and their combination are each associated with poor outcomes. Anesthesiology, 122(1), 3–4. http://doi.org/10.1097/ALN.0000000000000518
-Clevenger, B., & Richards, T. (2015). Pre-operative anaemia. Anaesthesia, 70 Suppl 1, 20–8–e6–8. http://doi.org/10.1111/anae.12918
-de Almeida, J. P., Vincent, J.-L., Galas, F. R. B. G., de Almeida, E. P. M., Fukushima, J. T., ---- Osawa, E. A., et al. (2015). Transfusion requirements in surgical oncology patients: a prospective, randomized controlled trial. Anesthesiology, 122(1), 29–38. http://doi.org/10.1097/ALN.0000000000000511
-Green, L., Allard, S., & Cardigan, R. (2015). Modern banking, collection, compatibility testing and storage of blood and blood components. Anaesthesia, 70 Suppl 1, 3–9– e2. http://doi.org/10.1111/anae.12912
-Shah, A., Stanworth, S. J., & McKechnie, S. (2015b). Evidence and triggers for the transfusion of blood and blood products. Anaesthesia, 70 Suppl 1, 10–9– e3–5. http://doi.org/10.1111/anae.12893
-White, M. J., Hazard, S. W., Frank, S. M., Boyd, J. S., Wick, E. C., Ness, P. M., & Tobian, A. A. R. (2015). The evolution of perioperative transfusion testing and blood ordering. Anesthesia and Analgesia, 120(6), 1196–1203. http://doi.org/10.1213/ANE.0000000000000619

Perioperative blood management is a hot topic currently. An editorial by Bailey et al. prefaces the 'transfusion, thrombosis and management of bleeding' Anaesthesia supplement. The editorial mentions new trends in blood transfusion such as restrictive transfusion strategies, 'point of care' coagulation testing with TEG or ROTEM and the use of factor concentrates in Europe, as an alternative to FFP. Patient blood management refers to perioperative blood or product transfusion and adjuvant therapies (drugs and techniques to reduce or prevent blood loss and the need for transfusion of allogenic blood). The American ASA has released an updated report by the taskforce that includes greater use of pharmacologic therapies (EPO, iron, prothrombin complex concentrates and antifibrinolytic therapies). The taskforce recommends thorough patient evaluation well in advance of surgery to allow for proper patient consent and preparation. Multidisciplinary consultation may be required to manage perioperative anticoagulation strategies. Protocols for perioperative blood management include: multimodal protocols or algorithms, restrictive versus liberal transfusion criteria, avoidance of transfusion, a massive transfusion protocol and maximal blood order schedules. The taskforce strongly advocate the use of transfusion algorithms based on point of care testing. The decision to transfuse (between 6-10g/dl) should be based on potential or actual ongoing bleeding, intravascular volume status, signs of organ ischaemia and adequacy of cardiopulmonary reserve. They also advocate the use of transfusion algorithms, especially those based on point of care testing (TEG or ROTEM), blood ordering schedules and restrictive transfusion strategies. The guidelines also include suggested criteria for perioperative transfusion of non-blood products. Many of these themes are highlighted by a review article about preoperative anaemia by Clevenger et al. These authors believe there are three pillars to perioperative blood management: anaemia management, minimisation of blood loss and appropriateness of transfusion. They

recommend a detailed investigation of preoperative anaemia and encourage significant effort to remedy any iron deficiency. An excellent article by Shah et al. reviews the evidence and triggers for transfusion of blood and blood products. These authors feel the evidence lies strongly in favour of restrictive strategies particularly for reducing the risk of healthcare associated infections. They provide a detailed evidence base for the use of prophylactic blood and blood products. However, they do state that there are limitations to the value of conventional coagulation tests in predicting prophylactic blood product transfusion. Another article by Green et al. reviews modern banking, collection, compatibility testing and storage of blood and blood components and the evolution of perioperative transfusion and blood ordering in the US is reviewed by White et al. An interesting study by Almeida et al. investigated postoperative administration of PRBC in patients admitted to the surgical ICU after abdominal cancer surgery. The study was a controlled, parallel-group (n=198) double blind superiority trial in which patients were randomized to receive blood transfusions using restrictive (Hb <7 g/dl) or liberal (Hb <9g/dl). The authors found that patients randomised to the liberal strategy had a lower absolute risk of the 30-day composite endpoint (all cause mortality, CV complications, ARDS, AKI requiring RRT, septic shock or reoperation, 35.6% vs 19.6% (p=0.012). The accompanying editorial by Cata et al. states that the work by Almeida supports previous studies indicating that perioperative anaemia is a predictor of mortality in patients with cancer and the study indicates that maintaining a Hb above 9g/dl is prudent in cancer surgery patients and that perioperative blood management strategies are particularly relevant in this population.

THM: The current evidence-base for optimisation of anaemia preoperatively and perioperative restrictive blood transfusion strategies in non-cancer patients (Hb ≤ 70) is strong and growing.

3 Perioperative antibiotics

-Shafer, S. L. (2015). Making a difference in perioperative infection. Anesthesia and Analgesia, 120(4), 697–699. http://doi.org/10.1213/ANE.0000000000000641
-Gordon, R. J. (2015). Administration of parenteral prophylactic Beta-lactam antibiotics in 2014: a review. Anesthesia and Analgesia, 120(4), 877–887. http://doi.org/10.1213/ANE.0000000000000468
-Gravenstein, N., Fish, J. T., Klinker, K. P., & Coursin, D. B. (2015). Prophylactic perioperative antibiotic administration: is it time to infuse our practices with new approaches? Anesthesia and Analgesia, 120(4), 709–711. http://doi.org/10.1213/ANE.0000000000000541
-Prielipp, R. C., & Brull, S. J. (2015). If one is good, are two always better? Anesthesia and Analgesia, 120(4), 706–708. http://doi.org/10.1213/ANE.0000000000000231
-Ruoff KL, Heard SO, Yeager MP, Dodds TM. The epidemiology of Staphylococcal aureus transmission in the anesthesia work area. Anesth Analg 2015;120:807–18
-Loftus RW, Brown JR, Patel HM, Koff MD, Jensen JT, Reddy S, Ruoff KL, Heard SO, Dodds TM, Beach ML, Yeager MP. Transmission dynamics of gram-negative bacterial pathogens in the anesthesia work area. Anesth Analg 2015;120:819–26
-Loftus RW, Koff MD, Brown JR, Patel HM, Jensen JT, Reddy S, Ruoff KL, Heard SO, Yeager MP, Dodds TM. The dynamics of Enterococcus transmission from bacterial reservoirs commonly encountered by anesthesia providers. Anesth Analg 2015;120:827–36
-Fernandez PG, Loftus RW, Dodds TM, Koff MD, Reddy S, Heard SO, Beach ML, Yeager MP, Brown JR. Hand hygiene knowledge and perceptions among anesthesia providers. Anesth Analg 2015;120:837–43
Munoz-Price LS, Weinstein RA. Fecal patina in the anesthesia work area. Anesth Analg 2015;120:703–5

-Birnbach DJ, Rosen LF, Fitzpatrick M, Carling P, Munoz- Price LS. The use of a novel technology to study dynamics of pathogen transmission in the operating room. Anesth Analg 2015;120:844–7
-Birnbach DJ, Rosen LF, Fitzpatrick M, Carling P, Arheart KL, Munoz-Price LS. Double gloves: a randomized trial to evaluate a simple strategy to reduce contamination in the operating room. Anesth Analg 2015;120:848–52
Loftus RW, Koff MD, Birnbach DJ. The dynamics and implications of bacterial transmission events arising from the anesthesia work area. Anesth Analg 2015;120:853–60
-Cole DC, Baslanti TO, Gravenstein NL, Gravenstein N. Leaving more than your fingerprint on the intravenous line: a prospective study on propofol anesthesia and implications of stopcock contamination. Anesth Analg 2015;120:861–7
-Walz JM, Ellison RT III, Mack DA, Flaherty HM, McIlwaine JK, Whyte KG, Landry KE, Baker SP, Heard SO, and the CCOC Research Group. The bundle "plus": effect of a multi- disciplinary team approach to eradicate central line-associated bloodstream infections. Anesth Analg 2015;120:868–76

A comprehensive collection of 14 articles in Anesthesia Analgesia investigates the anaesthetist's role in prevention of perioperative infection. Loftus and Fernandez et al. have done 3 studies investigating mode of transmission of 3 common hospital pathogens (staph aureus, gram negative organisms and enterococcus). Both staph aureus and gram negative organisms were found to be transmitted from contact with infected surfaces but most transmission of enterococci were from provider's hands. They then published a survey investigating clinician knowledge of hand hygeine survey and highlighted the fact that clinicians fail to recognise the need to wash or hands after contact with contaminated patients and environmental reservoirs. Editorials by Hopf et al. emphasise the onus on clinicians to reduce cross- contamination and on Munoz-Price et al. highlight the need for systems to be in place that increase compliance with environmental disinfection of the OR. Birnbach et al. have published two articles. In the first, the group used fluorescent technology to identify contamination in the anesthesia workspace and during an intubation simulation found that contamination from the mouth of a mannequin spread widely and quickly around the workspace. Their second publication studying a similar simulation showed that double gloving prior to intubation reduced the contaminated sites. The associated editorial by Prielipp et al. supports the practice of 'double gloving' prior to intubation. A review by Loftus et al. focused on this area noted bacterial transmission in the in the anaesthesia work area causes patient harm and requires a multimodal approach targeting hand hygiene, patient screening and decolonisation, environmental decontamination and improvements in intravascular handling and design to reduce to risk of postoperative infections. An article by Cole et al. shows that propofol can support bacterial growth and recommends that if intravenous access is required postoperatively, infusion sets that have been used for propofol should be changed prior to the patient leaving PACU. Walz et al. have published their very favourable results in reducing central line associated bloodstream infections with the use of a 'bundle'.

Of perhaps significant relevance to clinicians is a review of administration of parenteral prophylactic antibiotics by Gordon. As a bare minimum, clinicians need to pay attention to perioperative temperature management and timely administration of prophylactic parenteral antibiotics. He makes the point that beta-lactam antibiotics (and clindamycin) work primarily via a process termed 'time-dependent killing' and therefore striving for maximum average tissue concentration at incision is paramount and requires administration 15-45 minutes prior to incision. Studies suggest that it does seem to require approximately 15-30 minutes for most cephalosporins to reach maximum tissue levels. In order to maximise the minimum

inhibitory concentration (MIC), most commonly used antibiotics also need relatively frequent redosing (every 1-2 half lives). For situations in which a surgical site incision would be catastrophic (TKR), he suggests the initial bolus should be followed immediately by a continuous infusion such that the same total dose of drug is administered as in the case of redosing. The accompanying editorial by Gravenstein supports the concepts of intelligent pharmacodynamic and pharmacokinetic dosing and redosing of antibiotics in operative patients. Many of the recommendations and concepts detailed in this collection of articles are easily achievable in all practice settings.

THM: It is very likely that most clinicians could do more to reduce the risk of perioperative infection in their patients by hand hygiene and comply more with current recommendations for administration of prophylactic antibiotics so that the first dose is given within 15-45 minutes prior to first incision.

4 Airway news

-Nørskov, A. K., Rosenstock, C. V., Wetterslev, J., Astrup, G., Afshari, A., & Lundstrøm, L. H. (2015). Diagnostic accuracy of anaesthesiologists' prediction of difficult airway management in daily clinical practice: a cohort study of 188 064 patients registered in the Danish Anaesthesia Database. Anaesthesia, 70(3), 272–281. http://doi.org/10.1111/anae.12955
-Huitink, J. M., & Bouwman, R. A. (2015). The myth of the difficult airway: airway management revisited. Anaesthesia, 70(3), 244–249. http://doi.org/10.1111/anae.12989
-Kristensen, M. S., Teoh, W. H. L., & Baker, P. A. (2015a). Percutaneous emergency airway access; prevention, preparation, technique and training. British Journal of Anaesthesia, 114(3), 357–361. http://doi.org/10.1093/bja/aev029
-Kristensen, M. S., Teoh, W. H., Rudolph, S. S., Tvede, M. F., Hesselfeldt, R., Børglum, J., et al. (2015b). Structured approach to ultrasound-guided identification of the cricothyroid membrane: a randomized comparison with the palpation method in the morbidly obese. British Journal of Anaesthesia, 114(6), 1003–1004. http://doi.org/10.1093/bja/aev123

Accurate prediction of the difficult airway continues to elude clinicians. A retrospective cohort study by Norskov et al. investigated the diagnostic accuracy of the anaesthesiologists' predictions of difficult tracheal intubation and difficult mask ventilation. Of note 3154 (93%) of difficult intubations in their cohort of 188 064 cases were unanticipated. Likewise, 808 (94%) of the difficult mask ventilations were unanticipated. The accompanying editorial suggests that airway management is always context-specific and the concept of the 'difficult airway' per se is misleading because of the complex situational interplay of patient, practioner, equipment, expertise and circumstances. In view of these factors they present a 'PHASE' checklist for use in airway assessment that takes into account: patient factors, history, airway examination, surgery planned and evaluation of vital signs. It is a sensible framework that gives a perspective on why airway management is often more challenging in sick patients and compromised patients having emergency surgery. Another editorial by Kristensen et al. eloquently explains why there is a definite shift away from the promotion of narrow cannula-over-needle techniques for percutaneous emergency airway access in favour of a standardized surgical technique.

THM: Pre-operative airway assessment is inconsistently performed and often unreliable. Management of the unanticipated difficult airway must always inform airway planning. There is a growing evidence base that suggest when a small-bore cannula is used for percutaneous emergency airway access there is a strikingly low success rate.

5 Transfusion complications

-Clifford, L., Jia, Q., Subramanian, A., Yadav, H., Wilson, G. A., Murphy, S. P., et al. (2015a). Characterizing the epidemiology of postoperative transfusion-related acute lung injury. Anesthesiology, 122(1), 12–20. http://doi.org/10.1097/ALN.0000000000000514
-Clifford, L., Jia, Q., Yadav, H., Subramanian, A., Wilson, G. A., Murphy, S. P., et al. (2015b). Characterizing the epidemiology of perioperative transfusion-associated circulatory overload. Anesthesiology, 122(1), 21–28. http://doi.org/10.1097/ALN.0000000000000513
-Simmons, J. W., & Pittet, J.-F. (2015). Revealing the real risks of perioperative transfusion: rise of the machines! Anesthesiology, 122(1), 1–2. http://doi.org/10.1097/ALN.0000000000000515
-Kenz, H. E., & Van der Linden, P. (2014). Transfusion-related acute lung injury. European Journal of Anaesthesiology, 31(7), 345–350. http://doi.org/10.1097/EJA.0000000000000015

Clifford et al. have published two articles investigating the incidence of transfusion related acute lung injury (TRALI) and transfusion associated circulatory overload (TACO) respectively. These two complications are the most common causes of transfusion related death in the US. The authors retrospectively examined 83,204 non-cardiac surgical patients in the Mayo Clinic databases. The incident rate TRALI was calculated as 1.4%. A strong theme of the publication is the likely under-reporting of this syndrome. The authors used the definition from the Canadian consensus statement whereby the diagnosis of TRALI was unequivocal if there was acute onset of acute lung injury following transfusion in the absence of LA hypertension. Product specific rates of TRALI were generally highest in the setting of mixed RBC & product transfusions and risk was 'dose-related'. The diagnosis of TRALI is critical for the identification of potential allo-immunized donors. The incident rate of TACO was calculated at 4.3%. The pathophysiologic mechanisms underlying TACO have largely been considered to be due to volume overload. The group identified potential cases by TACO criteria: acute respiratory distress in setting of a positive fluid balance, increased BNP, radiographic evidence of pulmonary oedema and evidence of LHF including increased CVP post-transfusion. Reports from a trauma population are notably absent. Interestingly, the median intraoperative transfusion volume was 650 ml. However, the median intraoperative fluid balance was 4,180 ml. The highest rates of TACO were in patients receiving mixed blood products, closely followed by those receiving FFP only. The accompanying editorial by Simmons et al. concludes with emphasising that the goal of minimising transfusions to limit patient exposure to adverse reactions is reasonable and practical. Another article by Kenz et al. reviews TRALI. These authors note that affected patients all require supplemental oxygen and most need tracheal intubation and ventilatory support, within 6 hours of receiving a plasma-containing blood component. Previous research has implicated donor-derived antibodies, however RBC and platelet transfusions have been involved in antibody-negative TRALI. Aggressive management of respiratory distress with oxygen and potentially mechanical ventilation represent the first step in management and is followed by standard therapies for ARDs. As well as making an accurate diagnosis, it is import to report all suspected cases to contribute to future preventative strategies.

THM: Minimising complications arising from blood transfusion should be an important consideration for anaesthetists and TRALI and TACO are leading causes of transfusion related morbidity and mortality.

6 Neuromuscular blocking drugs & anaphylaxis

-Mertes, P. M., & Volcheck, G. W. (2015). Anaphylaxis to neuromuscular-blocking drugs: all neuromuscular-blocking drugs are not the same. Anesthesiology, 122(1), 5–7. http://doi.org/10.1097/ALN.0000000000000516
-Saager, L., Turan, A., Egan, C., Mascha, E. J., Kurz, A., Bauer, M., et al. (2015). Incidence of intraoperative hypersensitivity reactions: a registry analysis: a registry analysis. Anesthesiology, 122(3), 551–559. http://doi.org/10.1097/ALN.0000000000000529
-Sheldon, J., & Philips, B. (2015). Laboratory investigation of anaphylaxis: not as easy as it seems. Anaesthesia, 70(1), 1–5. http://doi.org/10.1111/anae.12926
-Sprung, J., Weingarten, T. N., & Schwartz, L. B. (2015). Presence or absence of elevated acute total serum tryptase by itself is not a definitive marker for an allergic reaction. Anesthesiology, 122(3), 713–714. http://doi.org/10.1097/ALN.0000000000000584
- Reddy, J. I., Cooke, P. J., van Schalkwyk, J. M., Hannam, J. A., Fitzharris, P., & Mitchell, S. J. (2015). Anaphylaxis is more common with rocuronium and succinylcholine than with atracurium. Anesthesiology, 122(1), 39–45. http://doi.org/10.1097/ALN.0000000000000512

A retrospective New Zealand study by Reddy et al. analysed databases from two hospitals from a 7-year period (n=92,858) to calculate anaphylaxis rates for specific NMBs using patient exposures as the denominator. Twenty-one patients were diagnosed with anaphylaxis to a NMB. The incidence of anaphylaxis was 1 in 22,451 new patient exposures for atracurium, 1 in 2,080 for succinylcholine and 1 in 2,499 for rocuronium ($p<0.001$). The investigators feel that their findings will likely give anaesthetists pause to consider the place of rocuronium in their clinical armamentariums. The accompanying editorial highlights the regional differences regarding the relative risk of NMBs. The authors also comment on the fact that 9 of the 21 cases of identified NMB anaphylaxis did not meet the standard skin test criteria for positivity but correctly warranted inclusion based on clinical picture and adjunct testing. Another article by Sheldon et al. reviews the role of tryptase in investigation of anaphylaxis and recommends taking multiple samples for analysis after a suspected reaction and explores some of the difficulties in diagnosis of anaphylaxis. This if further examined by Sprung et al. who emphasise that the clinical presentation and baseline tryptase remain very important when assessing the diagnostic probablity of whether a clinical event can be attributed to anaphylaxis. They highlight that the diagnosis of anaphylaxis cannot conclusively be made from a single tryptase level, even when elevated, nor can an allergic reaction be excluded from a single measurement, even if within the normal range. An industry sponsored US study by Saager et al. searched the Cleveland clinic database for potential hypersensitivity reactions. The incidence of 'hypersensitivy' was 1 in 677 surgeries but the overall rate of anaphylaxis was found to be 1 in 4,583. In contrast to the NZ study, the authors didn't find a strong association of hypersensitivity with NMBs. They highlight the fact that pholcodine, an agent implicated in cross reactively sensitizing patients to non-depolarising NMBs, is available in France (high rates of reaction to NMB) but practically unavailable in the US, possibly explaining regional differences in anaphylaxis rates.
THM: In Auckland the rate of anaphylaxis to succinylcholine and rocuronium was approximately 10 fold higher than to atracurium. Evaluation of suspected anaphylaxis can be complex, however multiple, temporally-separated tryptase samples may assist in definitive diagnosis.

7 Respiratory depression

-Lee, L. A., Caplan, R. A., Stephens, L. S., Posner, K. L., Terman, G. W., Voepel-Lewis, T., & Domino, K. B. (2015). Postoperative opioid-induced respiratory depression: a closed claims analysis. Anesthesiology, 122(3), 659–665. http://doi.org/10.1097/ALN.0000000000000564

-Sessler, D. I. (2015). Preventing respiratory depression. Anesthesiology, 122(3), 484–485. http://doi.org/10.1097/ALN.0000000000000565

An alarming article by Lee et al. investigates Closed Claims for respiratory depression in acute pain populations. In the 92 cases where respiratory depression was deemed to be a likely factor, 77% resulted in severe brain damage or death. Contributing and potentially actionable factors included multiple prescribers, concurrent administration of non-opioid sedation medications and inadequate nursing assessments or response. The vast majority occurred within 24h or surgery, nearly half had continuous opioid infusions at the time and 97% were judged preventable. Somnolence was noted in 62% of cases before the event. The accompanying editorial suggests that continuous respiratory monitoring should be considered.

THM: Post-operative opioid induced respiratory remains a significant cause of death and brain damage in the perioperative period. Improvements in monitoring sedation level are required.

8 Temperature Management

-Hopf, H. W. (2015). Perioperative temperature management: time for a new standard of care? Anesthesiology, 122(2), 229–230. http://doi.org/10.1097/ALN.0000000000000552

-Sun, Z., Honar, H., Sessler, D. I., Dalton, J. E., Yang, D., Panjasawatwong, K., et al. (2015). Intraoperative core temperature patterns, transfusion requirement, and hospital duration in patients warmed with forced air. Anesthesiology, 122(2), 276–285. http://doi.org/10.1097/ALN.0000000000000551

Sun et al. evaluated core temperatures in 58,814 adults having surgery lasting >60 min who were warmed with forced air. They found that hypothermia was routine during the first hour of anaesthesia, despite warming. Nearly half the patients had core temperatures <36° C for more than one hour and twenty percent of patients had temperatures <36° C for more than two hours. The authors note that, consistent with other reports, intraoperative forced air did not prevent redistribution hypothermia. This also explains the paradox that it is more difficult to end with normothermia in shorter than in longer cases because temperature only consistently increases when redistribution is complete. Hypothermia significantly increased both transfusion requirements and duration of hospitalization but only the increase in transfusion was clinically important. The accompanying editorial suggests pre-warming is feasible and effective.

THM: Even with routine forced air warming, intraoperative hypothermia is common and often prolonged. Pre-warming is the only strategy proven to prevent redistribution hypothermia.

9 Lung ultrasound

-Barbara, D. W. (2015). Images in anesthesiology: bedside lung ultrasonography: a tool for rapid assessment of pneumothorax. Anesthesiology, 122(4), 921. http://doi.org/10.1097/ALN.0000000000000475

-Bouhemad, B., Mongodi, S., Via, G., & Rouquette, I. (2015). Ultrasound for "lung monitoring" of ventilated patients. Anesthesiology, 122(2), 437–447. http://doi.org/10.1097/ALN.0000000000000558

Bouhemad et al. has written a review that details how lung ultrasound (LUS) can be used by physicians at the bedside to manage hypoxaemic ventilated patients. The authors suggest a

methodical examination protocol and describe a scoring pattern that indicates normal pulmonary aeration (A-lines), interstitial syndrome (well-separated B-lines), pulmonary oedema/bronchopneumonia (coalescent B-lines) and lung consolidation (dynamic bronchograms and 'hepatization'). There is also an interesting description of altering PEEP and ventilator settings based on LUS findings in the critical care setting and an algorithm for the diagnosis of pneumothorax.

THM: Lung ultrasound is becoming a core critical care skill particularly for the diagnosis of pneumothorax and pleural effusion.

10 Regional anaesthesia update

-Kessler, J., Marhofer, P., Hopkins, P. M., & Hollmann, M. W. (2015). Peripheral regional anaesthesia and outcome: lessons learned from the last 10 years. British Journal of Anaesthesia, 114(5), 728–745. http://doi.org/10.1093/bja/aeu559

Kessler et al. have performed an extensive literature review regarding outcome following peripheral regional anaesthetic techniques. Where good quality evidence exists, the great majority of the blocks reviewed were associated with one or any combination of reduced postoperative pain, reduced opioid consumption, increased patient satisfaction and improved hospital efficiency. Outcome in supraclavicular block and TAP blocks were equivocal. The authors recommend low volumes for interscalene blocks.

THM: When a regional anaesthetic technique is required for lower limb analgesia, peripheral regional techniques appear to be safer than neuraxial analgesia. For upper limb surgery, there is evidence that postoperative analgesia is improved by all blocks with the exception of supraclavicular block.

11 Research

-Shulman, M. A., Myles, P. S., Chan, M. T. V., McIlroy, D. R., Wallace, S., & Ponsford, J. (2015). Measurement of disability-free survival after surgery. Anesthesiology, 122(3), 524–536. http://doi.org/10.1097/ALN.0000000000000586

Our colleagues (Shulman et. al) have published data to validate a research tool (WHODAS 2) that enables assessment of disability free survival in post-operative patients. It is a self-administered checklist that provides a global assessment everyday function. WHODAS was able to discriminate between those with a good and poor quality of recovery after surgery at day 30 and quality of life at 3, 6 and 12 months.

THM: Disability free survival is a patient-centered outcome and likely a much more relevant metric to patients than survival after surgery.

Good review articles

-Bittner, E. A., Shank, E., Woodson, L., & Martyn, J. A. J. (2015). Acute and perioperative care of the burn-injured patient. Anesthesiology, 122(2), 448–464. http://doi.org/10.1097/ALN.0000000000000559

-Hensley, N., Dietrich, J., Nyhan, D., Mitter, N., Yee, M.-S., & Brady, M. (2015). Hypertrophic cardiomyopathy: a review. Anesthesia and Analgesia, 120(3), 554–569. http://doi.org/10.1213/ANE.0000000000000538

-Mensah, P. K., & Gooding, R. (2015). Surgery in patients with inherited bleeding disorders. Anaesthesia, 70 Suppl 1, 112–20– e39–40. http://doi.org/10.1111/anae.12899
-Pilkington, S. A., Taboada, D., & Martinez, G. (2015). Pulmonary hypertension and its management in patients undergoing non-cardiac surgery. Anaesthesia, 70(1), 56–70. http://doi.org/10.1111/anae.12831